

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-19 (Cancelled):

Claim 20 (Original) A driving apparatus comprising at least two energy output sources including a fuel cell, said driving apparatus comprising an estimation unit that estimates at least either one of a remaining power and a variation thereof with regard to at least one of said at least two energy output sources; and an output distribution controller that regulates a distribution of total energy to be output from said at least two energy output sources among said at least two energy output sources, based on a result of the estimation by said estimation unit.

Claim 21 (Original) A driving apparatus in accordance with claim 20, wherein said estimation unit estimates at least either one of the remaining power and the variation thereof with regard to said fuel cell, based on either one of a remaining quantity of a fuel for said fuel cell and a remaining quantity of a raw material used to produce the fuel for said fuel cell.

Claim 22 (Original) A driving apparatus in accordance with claim 20, wherein said output distribution controller regulates the distribution while allowing at least one energy output source other than said fuel cell to have a negative output energy.

Claim 23 (Original) A driving apparatus in accordance with claim 20, wherein said output distribution controller changes a working energy output source according to a driving state of said driving apparatus, so as to output the total energy,

said output distribution controller forbidding a change of the working energy output source to a specific energy output source that is determined to have a remaining power of not greater than a preset level.

Claim 24 (Original) A driving apparatus in accordance with claim 20, wherein said output distribution controller changes a working energy output source according to a driving state of said driving apparatus, so as to output the total energy,

said output distribution controller performing a change of the working energy output source from a specific energy output source, which is determined to have a remaining power of not greater than a preset level, to another energy output source even if the driving state of said moving object recommends a selection of said specific energy output source as the working energy output source.

Claim 25 (Original) A driving apparatus in accordance with claim 24, wherein said output distribution controller performs a change of the working energy output source from said specific energy output source to said another energy output source in specific driving state of said driving apparatus, where a total torque output from both said specific energy output source and said another energy output source to said drive shaft of said driving apparatus is within a preset range.

Claim 26 (Original) A driving apparatus in accordance with claim 20, said driving

apparatus further comprising:

a driving state input unit that inputs a predetermined parameter representing a driving state of said driving apparatus,

wherein said output distribution controller varies a reference value, which is used to regulate to the distribution of the total energy to be output from said at least two energy output sources among said at least two energy output source based on the result of the estimation by said estimation unit, with a variation of the predetermined parameter.

Claim 27 (Original) A method of controlling a drive of a moving object that comprises at least two energy output sources including a fuel cell, said method comprising the steps of

(a) measuring at least either one of an output sustaining ability and a variation thereof with regard to at least one of said at least two energy output sources;

(b) setting a total energy to be output from said at least two energy output sources; and

(c) regulating energy to be output from each of said at least two energy output sources based on a result of the measurement in said step (a) and controlling said each energy output source, so as to output the total energy set in said step (b).

Claim 28 (Original) A moving object having a motor and a heat engine as power sources, said moving object comprising

a fuel cell and a secondary battery as electric power supplies of said motor;

a regulation unit that regulates supplies of electric power fed from said fuel cell and said secondary battery to said motor; and

a control unit that controls operations of said electric power supplies and said power sources according to a driving state of said moving object.

Claim 29 (Original) A moving object in accordance with claim 28, said moving object further comprising

a remaining charge measurement unit that measures a remaining charge of said secondary battery,

wherein said control unit drives said motor with said secondary battery as a working electric power supply in the case where the observed remaining charge is not less than a predetermined level, while said moving object is in a specific driving state that has been set in advance to select said motor as a working power source.

Claim 30 (Original) A moving object in accordance with claim 29, wherein said control unit drives said motor with said fuel cell as the working electric power supply in the case where the observed remaining charge is less than the predetermined level.

Claim 31 (Original) A moving object in accordance with claim 30, wherein said control unit causes an insufficiency of electric power to be compensated with electric power output from said secondary battery in a transient period before said fuel cell ensures a sufficient supply of electric power required to drive said motor, while said fuel cell is selected as a working electric power supply, and

the predetermined level is a certain remaining quantity set based on a quantity of electric power that enables the compensation.

Claim 32 (Original) A moving object in accordance with claim 28, said moving object further comprising:

a high torque condition decision unit that determines whether or not said moving object is in a specific driving state that satisfies a preset condition for requiring a high torque,

wherein said control unit drives both said heat engine and said motor as working power sources when it is determined that said moving object is in the specific driving state that satisfies the preset condition for requiring a high torque.

Claim 33 (Original) A moving object in accordance with claim 32, said moving object further comprising:

an accelerator travel measurement unit that measures an accelerator travel,

wherein the preset condition is that a variation in accelerator travel is not less than a predetermined value.

Claim 34 (Original) A moving object in accordance with claim 32, said moving object further comprising:

a required torque input unit that inputs a required torque,

wherein the preset condition is that the required torque is not less than a predetermined value.

Claim 35 (Original) A moving object in accordance with claim 32, said moving object further comprising

a drive mode switch that allows a driver of said moving object to select a specific drive mode for requiring a high torque,

wherein said high torque condition decision unit carries out the determination, based on an operating condition of said drive mode switch.

Claim 36 (Original) A moving object in accordance with claim 32, said moving object further comprising:

a remaining charge measurement unit that measures a remaining charge of said secondary battery,

wherein said control unit drives said motor with said secondary battery as a working electric power supply in the case where the observed remaining charge is not less than a predetermined level.

Claim 37 (Original) A moving object in accordance with claim 36, wherein said control unit drives said motor with said fuel cell as the working electric power supply in the case where the observed remaining charge is less than the predetermined level.

Claim 38 (Original) A moving object in accordance with claim 28, said moving object further comprising:

a second motor that is driven with said fuel cell and said secondary battery as the electric power supplies;

a regulation unit that regulates supplies of electric power respectively fed from said fuel cell and said secondary battery to said second motor; and  
auxiliary machinery that is linked with said heat engine and said second motor,  
wherein said control unit drives said second motor while said heat engine is at a stop.

Claim 39 (Original) A moving object in accordance with claim 38, said moving object further comprising

a remaining charge measurement unit that measures a remaining charge of said secondary battery,

wherein said control unit drives said second motor with said secondary battery as a working electric power supply in the case where the observed remaining charge is not less than a predetermined level.

Claim 40 (Original) A moving object in accordance with claim 39, wherein said control unit drives said second motor with said fuel cell as the working electric power supply in the case where the observed remaining charge is less than the predetermined level.

Claim 41 (Original) A moving object in accordance with claim 28, wherein said motor and said heat engine are respectively linked with different drive shafts.

Claim 42 (Original) A moving object in accordance with claim 41, said moving object further comprising:

a remaining charge measurement unit that measures a remaining charge of said secondary battery,

wherein said control unit drives said motor with said secondary battery as a working electric power supply in the case where the observed remaining charge is not less than a predetermined level.

Claim 43 (Original) A moving object in accordance with claim 42, wherein said control unit drives said motor with said fuel cell as the working electric power supply in the case where the observed remaining charge is less than the predetermined level.

Claim 44 (Original) A moving object in accordance with claim 28, wherein said control unit activates said fuel cell, so as to cause said fuel cell to output a preset electric power, even when it is not required to supply electric power from said fuel cell to said motor.

Claim 45 (Original) A moving object in accordance with claim 44, said moving object further comprising:

a power estimation decision unit that determines whether or not said moving object is in a specific driving state that satisfies a preset condition, in which there is a little possibility of requirement of an increase in total power to be output from said power sources,

wherein said control unit reduces the preset electric power when it is determined that said moving object is in the specific driving state that satisfies the preset condition.



Claim 46 (Original) A moving object in accordance with claim 45, said moving object further comprising:

a transmission that changes speed of power output from a working power source according to the driving state of said moving object and outputs the converted power to a drive shaft and

an operation unit that specifies a working condition of said transmission,

wherein the preset condition is that the working condition of said transmission is set to a non driving state by said operation unit.

Claim 47 (Original) A moving object in accordance with claim 45, said moving object further comprising:

a braking decision unit that determines whether or not said moving object is in the course of braking,

wherein the preset condition is that said moving object is being braked.

Claim 48 (Original) A moving object in accordance with claim 45, said moving object further comprising:

an information receiving unit that receives information regarding whether or not a pathway, on which said moving object runs, is in a jam,

wherein the preset condition is that the pathway is in a jam.

Claim 49 (Original) A moving object having a motor and a heat engine as power sources to output power to a drive shaft, said moving object comprising

a transmission that varies a change gear ratio in the process of transmitting power output from at least said heat engine to said drive shaft;

a fuel cell that feeds a supply of electric power to said motor and

a control unit that controls operations of said fuel cell, said power sources, and said transmission according to a driving state of said moving object.

Claim 50 (Original) A moving object in accordance with claim 49, said moving object further comprising:

a high torque condition decision unit that determines whether or not said moving object is in a specific driving state that satisfies a preset condition for requiring a high torque,

wherein said control unit drives both said heat engine and said motor as working power sources when it is determined that said moving object is in the specific driving state that satisfies the preset condition for requiring a high torque.

Claim 51 (Original) A moving object in accordance with claim 49, said moving object further comprising:

a drive mode switch that allows a driver of said moving object to select a specific drive mode for requiring a high torque,

wherein said control unit drives both said heat engine and said motor as working power sources when said drive mode switch is in a predetermined state.

Claim 52 (Original) A moving object in accordance with claim 49, wherein said control unit activates said fuel cell, so as to cause said fuel cell to output a preset electric power, even when it is not required to supply electric power from said fuel cell to said motor.

Claim 53 (Original) A moving object in accordance with claim 52, said moving object further comprising:

a power estimation decision unit that determines whether or not said moving object is in a specific driving state that satisfies a preset condition, in which there is a little possibility of requirement of an increase in total power to be output from said power sources,

wherein said control unit reduces the preset electric power when it is determined that said moving object is in the specific driving state that satisfies the preset condition.

Claim 54 (Original) A moving object in accordance with claim 53, said moving object further comprising:

an operation unit that specifies a working condition of said transmission,

wherein the preset condition is that the working condition of said transmission is set to a non driving state by said operation unit.

Claim 55 (Original) A moving object in accordance with claim 53, said moving object further comprising:

a braking decision unit that determines whether or not said moving object is in the course of braking, and

wherein the preset condition is that said moving object is being braked.

Claim 56 (Original) A moving object in accordance with claim 53, said moving object further comprising:

an information receiving unit that receives information regarding whether or not a pathway, on which said moving object runs, is in a jam,

wherein the preset condition is that the pathway is in a jam.

Claim 57 (Original) A moving object in accordance with claim 28, said moving object further comprising”

a generator that is used as another electric power supply of said motor and converts power output from said heat engine to electric power, wherein said control unit comprises:

a driving state decision unit that determines whether or not said moving object is in a specific driving state that requires said fuel cell to start power generation; and

an electric power compensation unit that causes said electric power supplies other than said fuel cell to compensate for said fuel cell and output a required electric power in a period before said fuel cell is ready for power generation, when it is determined that the driving state of said moving object requires said fuel cell to start power generation,

said electric power compensation unit comprising

an electric power estimation unit that estimates an amount of electric power to be compensated in the period before said fuel cell is ready for power generation;

a remaining charge measurement unit that measures a remaining charge of said secondary battery;

a secondary battery capacity determination unit that determines whether or not said secondary battery has a sufficient capacity of enabling output of the estimated amount of electric power, based on the observed remaining charge; and

a heat engine control unit that drives said heat engine and causes said generator to carry out power generation when it is determined that said secondary battery does not have the sufficient capacity of enabling output of the estimated amount of electric power.

Claim 58 (Original) A moving object in accordance with claim 57, wherein said heat engine is a power source that outputs power only to drive said generator.

Claim 59 (Original) A moving object in accordance with claim 57, said moving object comprising:

a temperature measurement unit that measures temperature of said fuel cell;  
and

a cold-time control unit that causes said electric power compensation unit to function effectively at a cold time, when the observed temperature of said fuel cell is not higher than a predetermined value.

Claim 60 (Original) A moving object in accordance with claim 57, wherein said heat engine control unit drives said heat engine in a specific driving state, which gives a preference to a driving efficiency, as long as an insufficiency of electric power output from said secondary battery is at least compensated.

Claim 61 (Original) A method of controlling a drive of a moving object, said moving object having a heat engine and a motor as power sources and a fuel cell and a secondary battery as electric power supplies of said motor, said method comprising the steps of:

- (a) measuring a remaining charge of said secondary battery;
- (b) determining whether or not said moving object is in a specific driving state that has been set in advance to select said motor as a working power source; and
- (c) driving said motor with said secondary battery as a working electric power supply in the case where the observed remaining charge is not less than a predetermined level, when it is determined that said moving object is in the specific driving state.

Claim 62 (Original) A method in accordance with claim 61, said method further comprising the step of:

- (d) driving said motor with said fuel cell as the working electric power supply in the case where the observed remaining charge is less than the predetermined level, when it is determined that said moving object is in the specific driving state.

Claim 63 (Original) In a moving object having a fuel cell, a secondary battery, and a heat engine with a generator as electric power supplies, a method of controlling operations of said respective electric power supplies, said method comprising the steps of:

- (A) determining whether or not said moving object is in a specific driving state that requires said fuel to start power generation; and
- (B) causing said electric power supplies other than said fuel cell to compensate for said fuel cell and output a required electric power in a period before said fuel cell is ready for power generation, when it is determined that the driving state of said moving object requires said fuel cell to start power generation,  
said step (B) comprising the steps of

(B1) estimating an amount of electric power to be compensated in the period before said fuel cell is ready for power generation;

(B2) measuring a remaining charge of said secondary battery;

(B3) determining whether or not said secondary battery has a sufficient capacity of enabling output of the estimated amount of electric power, based on the observed remaining charge; and

(B4) driving said heat engine and causing said generator to carry out power generation when it is determined that said secondary battery does not have the sufficient capacity of enabling output of the estimated amount of electric power.

Claim 64 (Original) A hybrid system comprising a plurality of energy output sources, which include at least a fuel cell and a heat engine, and an energy transmission unit that causes energy of said energy output sources to be output to outside in a usable form, said hybrid system further comprising:

a required energy setting unit that sets a total required energy to be output;

a target driving state setting unit that sets respective target driving states of said fuel cell, said heat engine, and said energy transmission unit, while said fuel cell is preferentially used to output the total required energy;

a decision unit that determines whether or not a preset condition regarding a working state of said hybrid system is fulfilled;

a state change unit that, when it is determined that the preset condition is fulfilled, changes the target driving state of at least one of said fuel cell, said heat engine, and said energy transmission unit to a predetermined state according to the preset condition; and

a drive control unit that controls said plurality of energy output sources including at least said fuel cell and said heat engine as well as said energy transmission unit to meet the respective target driving states.

Claim 65 (Original) A hybrid system in accordance with claim 64, said hybrid system further comprising:

a drive mode switch that is operated by a driver to specify a desired drive mode, wherein the preset condition, whose fulfillment is determined by said decision unit, is an operating state of said drive mode switch.

Claim 66 (Original) A hybrid system in accordance with claim 65, wherein the energy is electrical energy,

the preset condition is that a predetermined drive mode, which allows output of electrical energy to outside, is specified through an operation of said drive mode switch, and

the change carried out by said state change unit represents prohibition of a drive of said heat engine.

Claim 67 (Original) A hybrid system in accordance with claim 66, said hybrid system further comprising:

a starter switch that is operated by the driver to direct a start of said heat engine, wherein the preset condition is that the start of said heat engine is directed through an operation of said starter switch, while the predetermined drive mode is specified, and



the change carried out by said state change unit represents the start of said heat engine.

Claim 68 (Original) A hybrid system in accordance with claim 65, wherein the energy is mechanical energy,

the preset condition is that a predetermined drive mode, in which either one of said fuel cell and said heat engine is selected and used as a working energy output source, is specified through an operation of said drive mode switch, and

the change carried out by said state change unit represents execution of a drive of the working energy output source and prohibition of a drive of the other energy output source, which is other than the working energy output source.

Claim 69 (Original) A hybrid system in accordance with claim 68, said hybrid system further comprising:

a starter switch that is operated by the driver to direct a start of the other energy output source,

wherein the preset condition is that the start of the other energy output source is directed through an operation of said starter switch, while the predetermined drive mode is specified, and

the change carried out by said state change unit represents the start of the other energy output source.

Claim 70 (Original) A hybrid system in accordance with claim 65, wherein the energy is mechanical energy,

the preset condition is that a predetermined drive mode, in which only said fuel cell is selected and used as a working energy output source, is specified through an operation of said drive mode switch, and

the change carried out by said state change unit represents execution of a drive of said fuel cell and prohibition of warm-up of said heat engine.

Claim 71 (Original) A hybrid system in accordance with claim 64, said hybrid system further comprising:

a detector that detects a power generation capacity of said fuel cell,

wherein the preset condition is that the power generation capacity is lowered to or below a predetermined level, and

the change carried out by said state change unit represents a reduction of output of said fuel cell.

Claim 72 (Original) A hybrid system in accordance with claim 71, wherein said detector detects the power generation capacity, based on a remaining quantity of a fuel for said fuel cell.

Claim 73 (Original) A hybrid system in accordance with claim 71, wherein said detector detects the power generation capacity, based on temperature of said fuel cell.

Claim 74 (Original) A hybrid system in accordance with claim 71, wherein the change carried out by said state change unit represents an increase in output of said heat engine.

Claim 75 (Original) A hybrid system in accordance with claim 71, wherein the energy is rotational energy of a rotating shaft,

said energy transmission unit comprises a speed change gear unit that switches a change gear ratio between at least two different stages, said speed change gear unit changing speed of the rotational energy output from each of said energy output sources at a preset change gear ratio and outputting the converted rotational energy, and

the change carried out by said state change unit represents an increase in change gear ratio set in said speed change gear unit.

Claim 76 (Original) A hybrid system in accordance with claim 64, said hybrid system further comprising:

a temperature measurement unit that measures temperature of said heat engine, wherein the preset condition is that the observed temperature of said heat engine is not higher than a predetermined level, and

the change carried out by said state change unit represents execution of warm-up of said heat engine.

Claim 77(Original) A hybrid system in accordance with claim 64, said hybrid system further comprising:

a temperature measurement unit that measures temperature of said heat engine; and  
a heat supply unit that feeds at least part of thermal energy generated by said fuel cell to said heat engine,

wherein the preset condition is that the observed temperature of said heat engine is not higher than a predetermined level, and

the change carried out by said state change unit represents an increase in output of said fuel cell.

Claim 78 (Original) A hybrid system comprising a plurality of energy output sources, which include at least a fuel cell and a heat engine, and an energy transmission unit that causes energy of said energy output sources to be output to outside in a usable form, said hybrid system further comprising:

an energy output source selection switch that is operated by a driver of said hybrid system to select at least one of said energy output sources as a working energy output source;

a target driving state setting unit that sets respective target driving states of said fuel cell, said heat engine, and said energy transmission unit according to the selection with said energy output source selection switch; and

a drive control unit that controls said plurality of energy output sources including said fuel cell and said heat engine as well as said energy transmission unit to the respective target driving states.

Claim 79 (Original) A hybrid system in accordance with claim 78, wherein said target driving state setting unit sets the target driving state of said heat engine to a specific condition that forbids not only a drive but warm-up of said heat engine, when only said fuel cell is selected as the working energy output source through operation of said energy output source selection switch.

Claim 80 (Original) A hybrid system in accordance with claim 64, said hybrid system further comprising:

an accumulator,

wherein said target driving state setting unit sets the respective target driving states by taking into account electrical energy input into and output from said accumulator.

Claim 81 (Original) A hybrid system in accordance with claim 78, said hybrid system further comprising:

an accumulator,

wherein said target driving state setting unit sets the respective target driving states by taking into account electrical energy input into and output from said accumulator.

Claim 82 (Original) A hybrid system in accordance with claim 64, said hybrid system is a moving object.

Claim 83 (Original) A hybrid system in accordance with claim 78, said hybrid system is a moving object.

Claim 84 (Original) A hybrid system comprising a plurality of energy output sources, which include at least a fuel cell and a heat engine, and an energy transmission unit that causes energy of said energy output sources to be output to outside in a usable form, said hybrid system further comprising:

a control unit that controls operations of said fuel cell and said heat

engine, in order to cause said fuel cell to be used and output energy preferentially, while both said fuel cell and said heat engine are ready for energy output.

Claim 85 (Original) A hybrid moving object comprising a plurality of energy output sources, which include at least a fuel cell and a heat engine, and an energy transmission unit that causes energy of said energy output sources to be output to outside in a usable form, said hybrid moving object further comprising:

a deterioration detector that detects deterioration of at least either one of said fuel cell and said heat engine; and

a deterioration time control unit that, when deterioration is detected with regard to one of said fuel cell and said heat engine, controls the other of said fuel cell and said heat engine to compensate for an effect on energy output due to the deterioration.

Claim 86 (Original) A hybrid moving object comprising a plurality of power output sources, which include at least a fuel cell and a heat engine, and a transmission mechanism that transmits power output from said power output sources to a drive shaft via a transmission, said hybrid moving object further comprising:

a deterioration detector that detects deterioration of said fuel cell;  
and

a transmission control unit that, when deterioration of said fuel cell is detected, controls said transmission to compensate for an effect on energy output due to the deterioration.

Claim 87 (Original) A method of controlling a drive of a hybrid system, said hybrid system comprising a plurality of energy output sources, which include at least a fuel cell and a heat engine, and an energy transmission unit that causes energy of said energy output sources to be output to outside in a usable form, said method comprising the steps of:

- (a) setting a total required energy to be output;
- (b) setting respective target driving states of said fuel cell, said heat engine, and said energy transmission unit, while said fuel cell is preferentially used to output the total required energy;
- (c) determining whether or not a preset condition regarding a working state of said hybrid system is fulfilled;
- (d) when it is determined that the preset condition is fulfilled, changing the target driving state of at least one of said fuel cell, said heat engine, and said energy transmission unit to a predetermined state according to the preset condition; and
- (e) controlling said plurality of energy output sources including at least said fuel cell and said heat engine as well as said energy transmission unit, so as to enable the total required energy to be output.

Claim 88 (Original) A moving object comprising a heat engine as a power source that outputs power to a drive shaft, and a motor that applies a torque to a specific site in order to compensate for a variation in torque output from said heat engine to said drive shaft, said moving object further comprising:

an accumulator that is charged with electric power and a power generator unit, which are included in an electric power system that transmits electric power to and from said motor;

a target torque setting unit that sets a torque to compensate for a variation in torque of said heat engine as a target torque of said motor; and

a control unit that selectively uses said accumulator and said power generator unit according to a sign of the target torque, so as to enable said motor to be driven with the target torque.

Claim 89 (Original) A moving object in accordance with claim 88, wherein said power generator unit comprises a fuel cell.

Claim 90(Original) A moving object in accordance with claim 88, said moving object further comprising:

a charge state detector that observes a charge level of said accumulator,

wherein said control unit carries out the control only when the observed charge level of said accumulator is not higher than a predetermined level.

Claim 91 (Original) A moving object comprising a heat engine as a power source that outputs power to a drive shaft and a control mechanism that checks a variation in torque output from said heat engine to said drive shaft, said moving object further comprising

wherein said control mechanism comprises:

a first motor and a second motor that apply a torque to said drive shaft;

an accumulator that is charged with electric power and a power generator unit, which are included in an electric power system that transmits electric power to and from said first and second motors.



a target torque setting unit that respectively sets target torques of said first motor and said second motor, as long as a condition of maintaining a torque to be output to said drive shaft, a condition of compensating for the variation in torque, a condition of making the torque of said first motor not greater than zero, and a condition of making the torque of said second motor not less than zero are fulfilled; and

a control unit that regulates electric power transmitted between said first motor and said accumulator and electric power transmitted between said second motor and said power generator unit, so as to enable said first motor and said second motor to be driven with the respective target torques.

Claim 92 (Original) A moving object in accordance with claim 91, wherein said power generator unit comprises a fuel cell.

Claim 93 (Original) A moving object in accordance with claim 91, said moving object further comprising:

a charge state detector that observes a charge level of said accumulator,

wherein said control unit carries out the control only when the observed charge level of said accumulator is not higher than a predetermined level.

Claim 94 (Original) A method of controlling a drive of a moving object, said moving object comprising a heat engine as a power source that outputs power to a drive shaft, and a motor that applies a torque to a specific site in order to compensate for a variation in torque output from said heat engine to said drive shaft, said method comprising the steps of:

(a) setting a torque to compensate for a variation in torque of said heat engine as a target torque of said motor and

(b) selectively using an accumulator and a power generator unit, which are included in an electric power system that transmits electric power to and from said motor, according to a sign of the target torque, so as to enable said motor to be driven with a target torque.